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10/717,279	11/19/2003	Steven J. Koester	YOR920030533US1 (17110)	7401
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/717,279

Applicant(s)

KOESTER, STEVEN J.

Examiner

Anh D. Mai

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-21 is/are pending in the application.
- 4a) Of the above claim(s) 10-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of the Claims

1. The Amendment filed December 26, 2007 is acknowledged. Claims 1 and 9 have been amended. Non-elected invention, claims 10-21 have been withdrawn. Claims 1, 2 and 4-21 are pending. Action on merits of claims 1, 2 and 4-9 follows.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131

USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

In this case, the independent claim 1 recites: blocking impurity dopant materials selected from the group comprising: In, **Pb**, Sb and **Sn**.

Among these elements, **Pb** and **Sn** are neutral-type impurity.

Claim 7 recites: said blocking impurity is a neutral-type impurity.

Which means the limitation of claim 7 is narrowed to Pb and Sn neutral-type impurity.

Claim 9 recites: transistor device *as claimed in Claim 7*, wherein said blocking impurity dopant comprises **C singly or in combination with said Sn or Pb**.

Which means the limitation of claim 9 is broader than claim 7 by adding C in to the previously claimed two elements. Therefore, claim 9 fails to further limit claim 7, thus claim 9 is indefinite.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 9 is rejected under 35 U.S.C. 102(e) as being anticipated by Xiang (US Patent No. 6,849,527) of record.

As best understood by Examiner, Xiang teaches a semiconductor field-effect transistor device substantially as claimed including:

a first strained layer (42) of semiconductor material doped of a first dopant type formed on a substrate (40);

a source region and a drain region (64) implanted with dopants of a second opposite type;

a gate electrode (54) separated from the first layer (42) by a dielectric region (56), and positioned between the source and drain regions (64);

substrate (40) having one or more threading dislocations, misfit dislocations or crystal defects that extends continuously from the source region to the drain region (64) at the interface between the first strained layer (42) of semiconductor material and substrate (40), and

blocking impurity dopant materials (neutral-type impurity (claim 7), C singly (claim 9)) that partially or fully occupies each one or more threading dislocations, misfit dislocation or crystal defects along the interface, wherein the blocking impurity dopant materials substantially inhibit diffusion of the implanted source and drain dopants from diffusing along the threading dislocations, misfit dislocations or crystal defect (185) along the interface. (See Fig. 3i).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2 and 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiang (U.S. Patent No. 6,749,527) in view of Noda et al. (U.S. Patent No. 6,432,802) all of record.

With respect to claim 1, Xiang teaches a semiconductor field-effect transistor device substantially as claimed including:

a first strained layer (42) of semiconductor material doped of a first dopant type formed on a substrate (40);

a source region and a drain region (64) implanted with dopants of a second opposite type; a gate electrode (54) separated from the first layer (42) by a dielectric region (56), and positioned between the source and drain regions (64);

substrate (40) having one or more threading dislocations, misfit dislocations or crystal defects that extends continuously from the source region to the drain region (64) at the interface between the first strained layer (42) of semiconductor material and substrate (40), and

blocking impurity dopant materials that partially or fully occupies each one or more threading dislocations, misfit dislocation or crystal defects along the interface, wherein the blocking impurity dopant materials substantially inhibit diffusion of the implanted source and drain dopants from diffusing along the threading dislocations, misfit dislocations or crystal defect (185) along the interface. (See Fig. 3i).

The blocking impurity dopant material of Xiang comprises carbon, a neutral-type impurity and device of Xiang further includes halo regions to suppress short channel punchthrough.

Thus, Xiang is shown to teach all the features of the claim with the exception of explicitly utilizing In, Pb, Sb and Sn for the blocking impurity dopant materials.

However, Noda teaches that it is well known in the art to form the halo region to block the encroachment of the source and drain dopants into the channel region utilizing indium (In) and antimony (Sb).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to form the halo blocking region of Xiang utilizing In or Sb blocking impurity as taught by Noda to prevent diffusion of the source/drain dopants into the channel region.

Regarding the threading dislocations, misfit dislocation or crystal defects, the dislocations or defects are inherent of the formation of strain layer on a substrate. (See AAPA).

With respect to claim 2, the first strained layer (42) of semiconductor material of Xiang comprises material selected from the group comprising Si.

With respect to claim 4, the semiconductor substrate (40) of Xiang includes a SiGe relaxed substrate.

With respect to claim 5 and 6, the device of Xiang includes NMOS and PMOS, where P, As or Sb singly or in combination are well known dopants for NMOS and B or In singly or in combination are well known dopants for PMOS. In view of Noda, blocking impurity of In or Sb are used for NMOS and PMOS, respectively, to prevent diffusion of the source/drain dopants into the channel region.

With respect to claim 7, the blocking impurity of Xiang is a neutral-type impurity.

With respect to claim 8, the blocking impurity of Xiang is a group IV impurity.

With respect to claim 9, the blocking impurity of Xiang is C.

Response to Arguments

6. Applicant's arguments filed December 26, 2007 have been fully considered but they are not persuasive.

With respect to Xiang '527, Applicant appears to contend that Xiang only teaches use of Carbon impurity implanted in a device active region for purpose of enhancing carrier mobility in that region.

However, the way that Xiang implants carbon, the neutral impurity, is the same as that of the instant invention. Therefore, the effect or result is the same.

Applicant further adds: 1. Xiang does not teaches nor suggest such impurity implants to perform a blocking function.

However, it is noted that "products of identical chemical composition can not have mutually exclusive properties". A chemical composition and its properties are inseparable. Therefore, if the prior art teaches an identical structure, the properties which presently discloses and /or claims are necessarily present. *In re Spada*, 15 USPQ 2d 1655, 1658 (Fed. Cir. 1990). In this case, the semiconductor structure of the claimed "blocking impurity" comprises a similar impurity as Xiang, e.g., neutral-type impurity dopant such as carbon, therefore, the semiconductor structure of Xiang should inherently have the same function such as "blocking"

as claimed. Moreover, carbon is also a claimed implanted impurity, see specification [0024] and claim 9.

Regarding the term “misfit dislocations or crystal defects along an interface”, as shown in the prior art, Figs. 1a-b, [0002], the misfit dislocation is inherently formed after growth of the silicon cap layer.

Applicant further argues: 2. Xiang does not teach impurity of In, Pb, Sb and Sn.

However, Noda does teach the use of implanted species In and Sb.

Applicant also argues: 3. Xiang’s and Noda’s teaching of use of halo region is not suggestive of the inventive implantation of impurity dopant material selected from the group comprising: In, Pb, Sb and Sn, that partially or fully occupies each said one or more threading dislocation.....

However, according to the specification, the blocking impurity doping is inherently resulted in partially or fully occupies the threading dislocation, misfit dislocation or crystal defects along the interface between the strained layer and the substrate. Or another word, the impurity will occupy the dislocation region by simply implanting the impurity into the substrate.

Therefore, regardless of the intended purpose of Xiang, the implantation of the neutral impurity of Xiang into the strained layer of semiconductor material should inherently result in the impurity dopant partially or fully occupies each one or more threading dislocation or crystal defects along the interface.

Since claim 1 is unpatentable over Xiang in view of Noda, claims 2 and 4-9, due to there dependency, are also unpatentable over the same references for the same reason.

The same also applies to claim 5 and 6 as well.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anh D. Mai/
Primary Examiner, Art Unit 2814